PATIENT LIFTER

BACKGROUND OF THE INVENTION

[0001] On occasion, immobile patients fall from a bed or chair onto the floor. It is often difficult to get the patient to their original position when they are in a prone position on the floor. It often takes several people in order to safely lift a patient from the floor and successfully back to their original position. Most prior art devices are used to transfer a patient from an original position on a bed or chair and do not extend their support surface to the floor. Without a support surface that extends to the floor, a patient on the floor needs to be manually lifted to a support surface in order to move the patient.

[0002] It is an object of the invention to provide a patient lifter that has a support surface that can extend downwardly to floor level.

[0003] It is another object of the invention to provide a patient lifter that can safely and easily lift a patient from a prone position on the floor.

[0004] It is yet another object of the invention to provide a patient lifter that is possible for a single person to use.

[0005] It is yet another object of the invention to provide a patient lift system that is easy and inexpensive to operate.

[0006] These and other objects of the invention will become apparent to one of ordinary skill in the art after reviewing the disclosure of the invention.

SUMMARY OF THE INVENTION

[0007] A patient lifter has a patient support platform that made be lowered until it touches the floor. Once in this position, it is a simple matter for a single person to place a patient who is prone on the floor onto the patient platform. Once on the platform, the patient support platform can be raised to a height sufficient to transfer the patient onto a bed or chair. The invention has many different devices for raising and lowering the patient support platform which may be chosen. The device is provided with wheels so that it may be easily transported to the site of the patient and be used to move the patient from place to place. The device can also be used to transfer a patient between beds. In this way, any difference in height between the beds does not pose a problem.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] **FIGURE 1** is a perspective view of the invention;

[0009] **FIGURE 2** is a front view of the invention in the lowered position with the raised position shown in phantom;

[0010] **FIGURE 3** is a side view of the device in the upright position;

[0011] **FIGURE 4** is a side view of the device in the lowered position;

[0012] **FIGURE 5** is a front view of a second embodiment of the invention in the lowered position, with the raised position shown in phantom;

[0013] **FIGURE 6** is a side view of the second embodiment of the device in the upright position;

[0014] **FIGURE 7** is a side view of the second embodiment of the device in the lowered position;

[0015] **FIGURE 8** is a front view of a third embodiment of the invention in a deployed position with the raised position shown in phantom;

[0016] **FIGURE 9** is a side view of the third embodiment of the device in the upright position;

[0017] **FIGURE 10** is a side view of the third embodiment of the device in the lowered position;

[0018] **FIGURE 11** is a front view of a fourth embodiment of the invention in the lowered position with the raised position shown in phantom;

[0019] **FIGURE 12** is a side view of the fourth embodiment of the device in the upright position;

[0020] **FIGURE 13** is a side view of the fourth embodiment of the device in the lowered position;

[0021] **FIGURE 14** is a front view of a fifth embodiment of the invention in the lowered position with the raised position shown in phantom;

[0022] **FIGURE 15** is a side view of the fifth embodiment of the device in the upright position;

[0023] **FIGURE 16** is a side view of the fifth embodiment of the device in the lowered position;

[0024] **FIGURE 17** is a front view of a sixth embodiment of the invention in the lowered position with the raised position shown in phantom;

[0025] **FIGURE 18** is a side view of the sixth embodiment of the device in the upright position;

[0026] **FIGURE 19** is a side view of the sixth embodiment of the device in a deployed position;

[0027] **FIGURE 20** is a front view of a seventh embodiment of the invention in the lowered position with the raised position shown in phantom;

[0028] **FIGURE 21** is a top view of the seventh embodiment of the invention with the collapsed position of the base shown in phantom;

[0029] **FIGURE 22** is a front view of an eighth embodiment of the invention in the lowered position with the raised position shown in phantom;

[0030] **FIGURE 23** is a top view of the eighth embodiment of the invention in the lowered position, with the upright position shown in phantom;

[0031] **FIGURE 24** is a front view of a ninth embodiment of the invention in the lowered position with the raised position shown in phantom;

[0032] **FIGURE 25** is a side view of the ninth embodiment of the device in the upright position;

[0033] **FIGURE 26** is a side view of the ninth embodiment of the device in the lowered position;

[0034] **FIGURE 27** is a front view of a tenth embodiment of the invention in the lowered position with the raised position shown in phantom;

[0035] **FIGURE 28** is a side view of the tenth embodiment of the device in the upright position;

[0036] **FIGURE 29** is a side view of the tenth embodiment of the device in the lowered position;

[0037] **FIGURE 30** is a front perspective view of an eleventh embodiment of the invention;

[0038] **FIGURE 31** is a front view of the patient support platform of the eleventh embodiment;

[0039] **FIGURE 32** is a top view of the eleventh embodiment of the device in the lowered position.

[0040] **FIGURE 33** is a front view of an twelfth embodiment of the invention;

[0041] **FIGURE 34** is an exploded view of the patient support platform of the twelfth embodiment;

[0042] **FIGURE 35** is a front view of the twelfth embodiment of the device in the lowered position;

[0043] **FIGURE 36** is a perspective view of a thirteenth embodiment of the device;

[0044] **FIGURE 37** is a front view of the thirteenth embodiment;

[0045] **FIGURE 38** is a top view of the thirteenth embodiment;

[0046] **FIGURE 39** is a rear view of the thirteenth embodiment;

[0047] **FIGURE 40** is a side view of the thirteenth embodiment in the upper position;

[0048] **FIGURE 41** is a side view of the thirteenth embodiment in the lower position;

[0049] **FIGURE 42** depicts the bottom surface of the patient support.

[0050] **FIGURE 43** shows the support transport brought near the patient's bed.

[0051] **FIGURE 44** shows the arrangement of the patient transport in preparation for transfer.

[0052] **FIGURE 45** shows the overlapping of the patient support with a patient's bed.

DETAILED DESCRIPTION OF THE INVENTION

[0053] The invention will now be described, beginning with reference to Figure 1. As seen in this figure, the patient lifter has two horizontally extending tubular members **22, 24.** The tubular members are provided with wheels **25** to form the base. The wheels not only allow the movement of the patient lifter from location to location, but also aid in the operation in the device, as will be described later. Extending upwardly from each of the tubular members is a vertical support **31, 32.** The vertical supports attach to, and support, a patient support platform **41** in a cantilevered fashion.

[0054] The tubular members extend from the vertical supports in the same direction as the patient support platform. In this way, the members prevent the patient lifter from tipping over, even when a patent is placed on the platform **41.** The vertical supports are connected at joints **43, 45** to the patient support platform to allow relative pivoting movement between the elements that is necessary for the patient lifter to operate.

[0055] Each vertical support has an extension **37, 38.** The extensions extend upwardly from the vertical support at an angle so as to diverge from one another. Connected between the vertical supports is an actuating piston **53.** The actuating piston **53** has a main body and two ends connected to the extensions **37, 38.** This connection also allows relative pivoting motion between the piston and extensions, as will be described hereinafter.

[0056] The patient support platform **41** is rectangular in shape, as in conventional for any surface designed to support a person in a reclined position. One of the long sides of the platform is attached to the vertical supports and extends from the vertical supports in a cantilever fashion. The opposite long side of the platform remains open for the easy transfer of a patient onto the platform. When the patient support platform is lowered to be in contact with the ground, a patient is transferred from the floor to the platform by moving the patient onto the platform along the open long side. The open long side

of the platform can have a removable railing to prevent a patient from falling from the patient platform after it has been raised from the floor.

[0057] The method of operation of the patient lifter is seen in Figures 2-4. In Figure 2, the patient lifter in its lowered position with the upright position shown in phantom. To operate the system, the piston **53** is actuated so that the ends of the piston are drawn inwardly, thereby reducing the distance between the extensions **37, 38**. As this distance decreases, the vertical supports **31, 32**, pivot about joints **43, 45** between the vertical supports and patient support platform **41**. As the distance between the extensions **37, 38** decreases, the distance between the vertical supports below the pivoting connection increases. The result is that the distance between tubular members **22, 24** of the base increases. As this distance increases, the wheels **25** allow the smooth, easy translations of these elements away from one another. As this occurs, the patient support platform **41** is lowered in elevation until it reaches the floor. Once in this position, it is a simple matter to transfer a patient from the floor onto the patient support platform **41**. When it is desired to raise the patient lifter back to its original position, the piston **53** is again actuated and the ends push outwardly to increase the distance between the extensions **37, 38**. As this occurs, the tubular members **22, 24** are drawn to one another as the vertical supports **31, 32** again pivot about its connection **43, 45** to the patient support platform **41**.

[0058] Figure 3 shows a side view of the patient lifter in its upright position. In this view, it can seen that the patient support platform **41** is spaced above the ground and the wheels **25** are completely underneath the tubular member **24**. The vertical support **32** extends vertically upwardly from the tubular base member **24**. In Figure 4, the lowered position of the patient lifter is seen in a side view. As can be readily seen, the patient support platform **41** is now lowered to the floor and the wheel **25** is located to the side of the tubular member **24**. The vertical member **32**, forming an angle with the floor, has a reduced vertical extent.

[0059] A second embodiment of the patient lifter is shown in Figure 5. In this embodiment, an actuating piston **153** extends between the tubular base members **22, 24.** In this instance, the effective length of the piston **153** is increased in order to increase the distance between the tubular members **22, 24** and lower the patient support surface **41.** The vertical supports **31, 32** are pivotally connected to the patient support system, but do not have any extension.

[0060] The side view of the patient support lifter is seen in Figure 6. In this figure, the patient lifter is in the upright position with the patient support surface **41** spaced well above the floor. After actuation of the piston **153,** and the lowering of the patient support system **41,** the patient lifter has the configuration shown in Figure 7. As can be seen, the patient support platform **41** is touching the ground and the wheels **25** are now situated to the side of the tubular base members **24** from their original position underneath the tubular base members **24.** Any conventional means can be used.

[0061] Turning now to Figure 8, a third embodiment of the patient lifter is seen having the tubular base members **22, 24** supported on wheels **25.** Again, a pair of vertical supports **31, 32** are connected to the patient support platform **41.** A central post **253** having a slot **255** is located between the vertical supports **31, 32.** The patient support platform **41** is connected by a bracket **256** to a central post **253.** The bracket **256** is raised and lowered along the slot. The central post **253** is supported by a wheel **257** to enable the movement of the patient lifter from location to location. As the bracket reaches the bottom-most position of the slot **255,** spaced above the floor by the presence of the wheel **257,** the patient support platform **41** is in contact with the floor. The bracket **256** allows the patient support platform **41** to be in contact with the ground and below the end of the slot **255** by bridging this distance. Any conventional means, such as a motor, can be used for the raising and lowering of the bracket **256** within the slot **255** in order to effectuate the raising and lowering of the patient support platform **41.**

[0062] Figure 11 shows a variation of the central post in a fourth embodiment of the invention. In this embodiment, the central tower **357** has a base supporting three wheels **357**. In this embodiment, the bracket **356** is positioned above the patient support platform **41**. The vertical supports **331, 332** are pivotally connected to the bracket **356**. Suspension supports **359** extend downwardly from the bracket **356** and connect to the patient support platform **41**. With the lowering of the bracket **356**, the vertical supports **331, 332** move outwardly and the patient support platform **41** is lowered to the floor. The bracket **356**, in its lower-most position, is still some distance from the floor, necessitating the use of the suspension support **359** to insure that the patient support platform **41** rests on the floor.

[0063] A cable **361** runs between and is connected to the vertical supports **331, 332**. The cables are connected to a winding mechanism **365**. Operation of the winding mechanism causes the cable to be taken up into the winding mechanism and the effective length of the cable is reduced. This action causes the distance between the vertical supports to decrease and raises the patient support platform **341** upwards. Letting the cable out from the winding mechanism lowers the patient support mechanism to the floor. In this way, the cable performs the function that a piston had in the earlier embodiments, but is able to traverse a longer distance without the inherent problems such a long piston would encounter.

[0064] The side view of this embodiment is shown in Figure 12 in its upright position. In this view, the suspension of the patient support platform **41** from the bracket **356** by the suspension support **359** is clearly seen. The lowered position is seen in Figure 13 and it can be seen that the distance between the lower-most position of the bracket **356** and the patient support platform **41** is bridged by the suspension support **359**. As in all embodiments, the wheels **25** change from a position underneath the tubular base member **324** to a position located to the side of the tubular base member **324**.

[0065] Turning now to Figure 14, a fifth embodiment of the patient lifter is depicted. In this embodiment, the patient lifter has tubular bases **422, 424** supported on wheels **25**. A pair of vertical supports **431, 432** extend upwardly to a patient support platform **41**. The patient support platform is raised and lowered by a gear train **453**. There are four gears with two end gears and two middle gears. Each end gear is rigidly connected to one of the vertical supports **431, 432**. The rigid connection insures that, as the gear rotates, the vertical support rotates with it. As the left-most gear turns clockwise, the vertical support **431** rotates clockwise. The next gear therefore moves counter-clockwise and the third gear moves clockwise. This causes the other end gear, rigidly attached to support **432** to move counter-clockwise. The vertical support **432** therefore rotates counter-clockwise, a direction opposite than the vertical support **431**. With the rotation of the vertical supports, the patient support platform is lowered until it reaches the floor. Any conventional means can be used to rotate the gears and lock them in place to prevent rotation and secure the patent support platform **41** at any elevation.

[0066] Figures 15 and 16 show the patient lifter in the upright and lowered position, respectively. The various parts, as they appear in these two positions, are shown. As can be seen in Figure 16, when in the lowered position, very little of the structure extends above the top surface of the patient support platform **41**.

[0067] A sixth embodiment of the patient lifter is shown in Figure 17. The patient lifter has a base with tubular base members **522, 524** supported on wheels **25** and connected to a telescopic cross member formed by middle section **525** and telescoping side members **526, 527**. A single central support tower **563** extends from the central telescopic member **525**. Telescoping tube **564** slides along the central vertical tower **563** and a pair of left support braces **571, 573** and right support braces **572, 574** extend from the telescoping tube **564**. The upper left support brace **573** has one end attached to the top of the telescoping tube and extends outwardly and attaches to en end of the lower left support brace **571** having its opposite end

pivotally connected to the central support tower **563**. Likewise, the upper right support brace **574** has one end attached to the top of the vertical telescoping tube **564** and has its other end connected to an end of the lower right support brace **572**. The lower right support brace has its remaining end attached to the central support tower **563**. Connected to, and extending between, the juncture of the left support braces and right support braces, is an actuating piston **553**. In a fully contracted position of the piston, the junctions of the left and right support braces are brought closer together and the telescoping tube **564** is in an upper position on the central vertical tower. As the actuating piston **553** increases in effective length, the junction between the left support braces and right support braces increases and the telescoping tube **564** assumes a lower position on the central vertical tower **563**. Attached to the telescoping tube is the patient support platform **41**. To complete the patient lifter, a pair of side supports **531, 532** extend from the left and right tubular base members **523, 524** to the top of the telescoping tube **564**. Lowering of the patient support platform causes the tubular base members **522, 524** to move away from each other.

[0068] The patient lifter **510** in its upright position is shown in Figure 18 and in its lower position in Figure 19. As can be seen, the telescoping tube **564** travels along the vertical post **563** in order to raise and lower the patient support platform **41**. The action of the piston **553** changes the geometry between the support braces in order to raise and lower the telescoping tube **564** along the central tower **563**.

[0069] Figure 20 shows a side view of an alternative base utilizing a single vertical central tower. The fully-extended position of the base is shown with the compacted position shown in phantom. In the compacted position, the patient support platform is in its raised position. The details of the base are more clearly seen with reference to Figure 21, depicting a top view of the patient lifter. In this view, it can be seen that the base consists of a central section **625** and two L-shaped sections **622, 624**, pivotally connected to each end of the central section. The central section supports a central vertical tower

653. As the patient support platform **41** is lowered, the L-shaped sections **622, 624** are pivoted so that the section initially perpendicular to the central section **625** becomes co-linear with the central section. This configuration allows sufficient clearance for the patient support platform to reach the floor without interfering with the base.

[0070] Figure 22 shows a front view of a base having a vertical tower as would be used with the embodiment shown in Figure 17. The mechanism for raising and lowering the patient support platform **41** is not shown. As can be seen, though, the patient support platform **41** is supported by, and travels along, a central vertical tower **753**. The operation of the base is best seen with reference to Figure 23, showing a top view of the patient lifter **710**. The base has a central telescoping section having a central tube **723** with telescoping sections **725, 726** which move in and out of the central section **723** to increase the width of the base. Attached to the left telescoping section **725** is the L-shaped left base member **722**. Similarly, attached to the right telescoping section **726** is the L-shaped base member **724**. The telescoping sections **725, 726** can be extended outwardly from the central section **723** in order to increase the effective width of the base.

[0071] A ninth embodiment is shown in Figure 24 having a base formed by a left member **822** and a right member **824** connected by a central member. The central member is formed by two sections **825, 827** connected to one another by a piston **853**. A pair of crossed vertical members **831, 833** extend upwardly from the left and right base members **822, 824**, respectively. The patient support platform **41** is supported by the crossing support members **831, 833**. With actuation of the piston **853**, the base members **822, 825** move apart from one another and the vertical height of the support members **831, 833** is decreased, lowering the elevation of the patient support platform **41**.

[0072] Turning now to Figure 25, the side view of the patient lifter **810** can be seen. Clearly seen is the manner in which the patient support platform **41** is suspended on the support members **831, 833**. A bracket **851** extends upwardly from the patient

support platform **41** and has a flange overlying and secured to the rounded top of the vertical members **831, 833.** The vertical members **831, 833** move back and forth within the flange **851** as its vertical extent is increased and decreased by action of the piston **853.** The fully lowered position of the patient lifter **810** is shown in Figure 26.

[0073] A tenth embodiment is shown in Figure 27. The patient lifter has tubular base members **922, 924** supported on wheels **25.** A vertical tower **963** is attached to the side proximate the vertical base member **922.** The vertical support tower **963** is formed by telescoping sections comprising inner tube **961** and outer tube **962.** A pull handle **927** is pivotally attached near the bottom of the vertical support tower **963.** The handle can be used when transporting the patient lifter from location to location.

[0074] A bracket **951** extends from the bottom of outer tube **962.** The patient support platform **941** is suspended outwardly from the bracket **951.** In order to raise and lower the patient support platform, a pair of scissor members **931, 932** are engaged in the bracket **951.** The left ends of both the scissor members **931, 932** are fixed to the patient lifter, whereas the right side is free to move. The right side of scissor member **932** is pivotally attached to the right tubular base member **924.** As the patient support platform **941** is lowered, the scissor member **932** causes the tubular base member **924** to move to the right. This is accomplished by a telescoping member forming the central base member **925** connected between the left and right tubular base members **922, 924.** The right end of the scissor member **931** has a roller end that is engaged in, and slides within, bracket **951.**

[0075] The upright position of the patient lifter **910** is shown in Figure 28 and the lowered position is shown in Figure 29.

[0076] Figure 30 is a front view of an eleventh embodiment of the invention. In this embodiment, the patient support platform is supported by two vertical towers **1031, 1032,** each connected to a horizontally extending base member **1022, 1024.** A central member **1025** connects the two vertical towers to one another at the juncture with the base members. The base members are connected to the central member by a hinge pin so that they can

move from a position perpendicular to the central member to a position parallel with the central member. The patient support platform has an L-shaped plate **1041** extending between the vertical towers that provides support when the base members are co-linear with the central member. This plate is L-shaped, having a first section extending downwardly from the patient support platform and a second plate extending outwardly. The patient support platform can be moved along the central towers by any conventional means, such as cables.

[0077] Figure 31 shows the front view of the patient lifter. The L-shaped base plate supplies support when the base members are rotated to be co-linear with the central member. Figure 32 shows the device in a lowered position with the base members co-linear with the central base member and the L-shaped plate providing support to the patient lifter.

[0078] Figure 33 is a twelfth embodiment of the patient lifter which resembles the embodiments shown in Figure 17-19. The only difference between the two embodiments is the lifting mechanism and therefore that is the only feature that will be described. In this embodiment, a lifting mechanism consists of a cable **561** extending from the top of the post **563** and about pulleys **565** and attaching to the juncture of the post **563** and cross-member **545**. A winding mechanism **569** reduces the effective length of the cable and draws in the pulleys **565** towards one another. With this action, the pulleys are raised upwardly as that is necessary in order for the pulleys to become closer together. With this action, the junctions between the members **571-573** and **572-574** are also brought closer together and the bracket **564** is raised along with post **563**.

[0079] Figure 36 discloses a thirteenth embodiment of the invention. This embodiment is very similar to that embodiment shown in Figure 30 through 32 and only the differences between the two are discussed. Figure 36 shows how an L-shaped support member **1051** is supported by the central member **1025**. The support member **1051** is raised and lowered by a jack **1055**.

[0080] Figures 37 and 38 show the front and top view, respectively, of the device. This embodiment also includes a rail guard **261** attached to the support surface by arms **1065**. The operation of the rail guard will be described in more detail hereinafter.

[0081] Figure 40 shows a side view of the device with the support surface in the upper position and the guard rail **1061** shown in the fully collapsed position with the upright position and semi-collapsed position shown in phantom. As can be seen, the support arms **1065** are formed by two members resulting in an L-shape. In the upright position, the first member extends from a pivoting joint attaching the arm to the underside of the support surface and extends to the outer edge of the support surface. The second arm extends upwardly from a second pivoting joint and supports the guard rail **1061**. Pivoting about the first pivoting joint results in the semi-collapsed position with the guard rail extending downwardly from the underside of the support surface. The use of this position will be described hereinafter. Pivoting about the second pivoting joint allows the guard rail **1061** to lie against the underside surface. As can be seen in Figure 41, the support surface can be lowered to the ground after support member **1051** has been completely lowered. In this position, the device is able to accept the transfer of a patient from floor level.

[0082] Figure 42 shows the head portion of a patient support **1160**. A frame **1163** is attached to and supports the patient support **1160**. A first pair of extensions **1164** extend from the side of the frame **1163** outwardly toward the support edge. A second set of extensions **1168** extends from the frame **1163** inwardly towards the midline of the support. Each extension terminates in a pivot **1170**.

[0083] Guard rails **1161, 1167** are attached to the pivots **1170**. Each guard rail has a pair of L-shaped arms **1165, 1169** extending from the pivot to the edge of the support and then perpendicular to the support to provide safety to the patient. The L-shaped arms may be individual pieces or the pairs may be connected together by a bar extending between their top ends.

[0084] In Figure 42, one guard rail is shown in the engaged position with the second guard rail shown in the retracted position. The alternated position of each guard rail is shown in phantom. The second set of arms **1169** terminate at the pivot **1170** more than halfway between the edge and the midline of the support. Therefore, the arms **1169** extending from the pivot to the edge causes the guard rail **1167** to have a retracted position past the midline. The other guard rail **1161** in a retracted position is in abutting position to the other guard rail **1167**.

[0085] With the structure of the guard rails described, the operation of the device will now be described.

[0086] Figure 43 shows the patient transport including a patient support. The patient support connects to a mast raising and lowering the level of the patient support. A base having wheels supports the mast, allowing the easy movement of the patient transport. This type of patient support is disclosed in U.S. Patent 5,996,150, herein incorporated by reference. As shown in Figure 43, the patient on the transport is brought in proximity to the patient's bed. In preparation of a patient transfer, the guard rail on the bed is lowered and the patient support is raised to a level above the bed. The guard rail on the edge closest to the patient's bed is moved to the retracted position. As clearly seen in Figure 44, the guard rail in the retracted position is past the midline of the support.

[0087] After the patient transport has been prepared for transfer, the patient transport is moved toward the bed until the support is over the bed. The position of the guard rail in the retracted position allows more than half of the support to be overlying the patient bed before the guard rail contacts the side of the bed. Once the support has overlapped its maximum extent, the patient support is lowered onto the bed. With this amount of overlap, the patient can be easily and safely transferred from the patient support to the patient's bed. If the support is made of articulated sections, each section may have its own set of guard rails.

[0088] While the invention has been described with reference to preferred embodiments, modifications or variations would be obvious to one of ordinary skill in the art. The invention encompasses such variations and modifications. For instance, the hydraulic pistons used in the invention can be replaced by an electric-driven screw mechanism.